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Some North American Botanists.

III. Andre Michaux.

The "elder Michaux," as he is called, has the double distinction of publishing the first Flora of North America, and of being the most indefatigable explorer this country has ever seen. Although he has left his name as author upon but two works, his numerous discoveries have furnished the basis of other publications. The work referred to besides the Flora of North America is a "History of North American Oaks," and neither of these were published till the year of the author's death, the former being edited by the eminent botanist Louis Claude Richard and the latter with the help of the son, F. A. Michaux. The whole object of Michaux's existence seems to have been to transplant to France from all quarters of the globe every species of plant that could be made useful, and presently this desire settled into such an eagerness for travel that he was never at rest, except by compulsion, and probably traversed more territory than any other botanist. An outline of his life is as follows: He was born in Versailles, March 7, 1746, and received his botanical education under the great Bernard de Jussieu. His first visit was to England; then several trips to the mountains of Auvergne, to the Pyrenees, and into Spain. From 1782 to 1785 he was in Persia in a political capacity, but really to explore a country that was then almost unknown to scientific men, and returned home with a large collection. The French government having become interested in the subject of introducing into France such exotic trees as would be useful in shipbuilding, Michaux was chosen to visit the United States, with a commission to send to France all the trees he could obtain. In September, 1785, he embarked with his son at L'Orient and arrived at New York on the 13th of November. He remained in this country until 1796, when he embarked from Charleston, S. C., for Amsterdam, but was wrecked on the coast of Holland. In this shipwreck it is stated, in the *Annales du Museum d'Histoire Naturelle*, that "Michaux was lashed to one of the yards, and was senseless when carried on shore," not recovering till some hours afterwards. His first thought was for his collections of ten busy years and he was gratified to learn that some of them were saved. "His plants having got wetted by the salt water, he was obliged to immerse them all in fresh water, and one

after another, to dry them between new papers." For three or four years he remained at home cultivating the plants he had forwarded from the United States and arranging materials for the volumes which were subsequently published. In 1800 he joined the expedition to Australia, under command of Captain Baudin. He became disgusted with his commander and abandoned the expedition at Mauritius, but soon went to Madagascar. There he established a botanical garden in which to cultivate his collections, but soon fell a victim to the unhealthy climate, and died with fever November 13, 1802.

Of course among American botanists the interest in Michaux centers about his travels in this country, which are said to have aggregated over 3,000 miles and this is probably very scant measure. In some respects he was more favorably situated for exploration than other botanists, for he was in the employ of a government that provided liberally for his needs; but while still at work here the revolution overtook France and Michaux was forgotten. In these circumstances he used his own means until they were exhausted and he was compelled to return home. The mere enumeration of his trips in this country would more than exhaust our space and the most important only can be given. He early established two botanical gardens, one in Bergen Co., N. J., and the other near Charleston, S. C.; the former to receive his collections from New Jersey, Pennsylvania, and Maryland; the latter those from the Carolinas and the southern Alleghany Mountains. It was from this Charleston garden probably that some exotics have spread and become naturalized in the Southern States, as for instance *Albizzia Julibrissin*. In April, 1787, Michaux set out upon his first journey to the Alleghany Mountains, going up the Savannah river to its sources, crossing the mountains and reaching the waters of the Tennessee. Thence he returned to Charleston, where he arrived in July. His next exploration was in East Florida, in the spring of 1788. In the autumn of the same year he again took a trip to the sources of the Savannah to obtain seeds and roots, the *Magnolia cordata* being the principal object of his search. The following winter was passed in the Bahama Islands. In June, 1789, he started to visit the mountains in North Carolina, ascending Black, Roan, and other mountains of that now famous region. Pushing across the mountains he descended the Tennessee side, with the intention of penetrating into Kentucky, but was prevented by the danger from Indians, and so contented himself with an exploration of the mountains of Virginia, crossing the wild regions of West Virginia along New River, etc. Finally he entered Maryland and reached Philadelphia by way of Lancaster, Penn. Going to New York he returned to Charleston through the lower grounds. In November of the same year he again explored the mountains of North Carolina. In 1792 he is recorded as botanizing in New Jersey and around New York. Thence up the Hudson to Albany,

and so on about Lake Champlain, reaching Montreal June 30, 1792. From Montreal he proceeded to Quebec, and thence by the Saguenay to Hudson's Bay, where, he says, "naught but a dreary vegetation was found, consisting of black and stunted pines, which bore their cones at four feet only from the ground." Returning to Philadelphia he proposed to Mr. Jefferson, then Secretary of State, to explore the country west of the Mississippi to the sources of the Missouri, and even to the Pacific waters, for the sum of £3,600. This was a bold proposition and one that was acted upon a few years later in the expedition of Lewis and Clark, but Michaux was never permitted to make the journey. In July, 1793, he started for Kentucky, descending the Ohio to Louisville and then back across Kentucky, West Virginia, and Virginia, to Philadelphia. Early in 1794 another extensive tour was made in the Southern States and the North Carolina mountains, and in 1795 the same trips were continued to Knoxville, Tenn. Thence he crossed the Cumberland Mountains and came to Nashville, and so on to Louisville, ascended the Wabash River to Vincennes and thence westward to the Illinois River and down it to the Mississippi and lower part of the Ohio. Ascending the Ohio and Cumberland, after many hardships, for it was midwinter, he finally reached Nashville and started for the Carolinas in February, 1796, stopping for a while again in his favorite North Carolina mountains with his favorite guide, Davenport, reaching Charleston in April. It was in August of this year that he embarked for Amsterdam and was shipwrecked.

Very many of our species of plants bear the familiar abbreviation "Mx." or "Michx." and not a few genera own him as their author, such as *Micranthemum*, *Elodea*, *Dichromena*, *Oryzopsis*, *Erianthus*, etc., etc. Unfortunately, the genus which commemorates him is one he discovered in Persia, and so his name cannot in this way be associated with North American botany, for which he did so much. His flora of North America contains, exclusive of nonvascular Cryptogams, but 1530 species, under 528 genera, just about the numbers which appear now in our numerous state catalogues, but of this number a very large proportion were new. Although but eleven years in this country he has left a deeper impression upon North American Botany than many a distinguished botanist has in a life time, and most surely gained the distinction of being *facile princeps* among our botanical explorers.

For further and more particular information concerning Michaux the reader is referred to the *Am. Jour. Sci.* 1.9.266 (Dr. W. J. Hooker "On the Botany of America"); 1.42.2 (Prof. Asa Gray on "Botanical Excursion to the Mountains of North Carolina"); 2. 24.161 (Elias Durand, "Biographical Memoir of the late F. A. Michaux"); Michaux's unpublished itinerary is preserved by the Am. Phil. Soc., at Philadelphia.

Eriodictyon glutinosum, Benth., as Illustrating Evolution.

(Plate II.)

As a teacher I have often been perplexed to answer the question of my pupils: why is it that to cells and tissues which so often shade into each other and which usually present such small differences you give distinct names? To the more advanced investigator, however, the problem comes in another shape, *i.e.* how is it that cells which start at first from a simple form of fundamental tissue eventually become so unlike? If the observer has allowed himself to philosophize over this question he most probably has learned to regard it as but another paragraph from the great chapter on evolution, and can hardly have escaped a wonder that cell variation is so little written or spoken of in this connection by botanists. Cell growth and development, whether rightly or wrongly, appear to have suffered a divorce from our ideas of specific evolution, yet the latter could not exist without the former. Simple parenchyma may be all sufficient for every form of thallus; but before a true caulome can rear its head into the air, there must be the differentiated, stiffening woody fibre; or before the hard-shelled nut could be produced, sclerenchyma must have appeared. Evidently then this differentiation has to do with success in the struggle for existence. But with all this, in the *great mass of plants* there appears to have come a settled average character in the different groups of cells and tissues; that is, differences marked enough exist, but we can read them through from the outside to the pith before ever a section has been made. On the other hand there are others which we have come to recognize as likely to show deviations from the regular order before we have examined them, though we cannot tell what directions those deviations will take. Some of these may serve to show evident connections between the different cell types in places where we hardly expected to find such links. I have recently been quite struck with this last class of facts in studying *Eriodictyon glutinosum* from the standpoint of practical pharmacy, though the facts themselves were entirely outside the objects I had in view, and have no bearing upon them. What I desire to call attention to here are simply gleanings which lay off, but alongside, the pharmaceutical trail.

A more striking instance of the connection between diverse forms of tissue can hardly be imagined than that furnished by the change from bast to sclerenchyma; the former being typically represented in the fibre which makes the napkins we use at the table, and the latter in the shell of the hickory nut which defies our youthful teeth. Yet figures 9 & 10 are taken from fibres in the Peruvian Bark which are so nearly on the boundary line that by some vegetable anatomists they are classed as bast and by others as sclerenchyma. Isolated in the pulp of pears are found the gritty grains of sclerenchyma, though from the same fundamental cells

come both the soft and the hard tissues. In the case of the pear there are manifest reasons for supposing the sclerenchyma to be a legacy from the period when pears as fruit were far less luscious than now. They are found in the pear stem as well as in the fruit. In the fully formed Sphagnum moss we recognize cells of two distinct characters; the one large, colorless, and with plain communication between the adjacent cells; the other small, having chlorophyll and destitute of communications; yet, if we may credit Huxley, both of these kinds are very similar in their early growth.

To return to the *Eriodictyon*, the character of the tissues have appeared to me to indicate how widely ultimate cell forms may depart from the original source out of which they all have sprung, and at the same time to show connecting links between even the most divergent members. In fact I am tempted to regard the whole plant as a forcible illustration of the doctrine of evolution.

Commence for example with figure 1, where we have the typical large, thin-walled, porous pith-cell, found in the very center of the stem. Outside of this, but still in the pith, are other smaller, thicker-walled cells, figure 2, which when observed on transverse section are roundish, but seen on longitudinal section are quite distinctly rectangular. More remote from the center of the pith, yet in it, we find the cells represented in figure 3; and this form is a direct transition to figure 4, which is taken from the medullary ray. Here then the transition, not by isolated cells, but by groups of cells, from one extreme of fundamental tissue to the other appears regular and gradual and ends in cells with well-marked sclerenchymatous character.

Suppose now we take the types of distinctly prosenchymatous character, which the bast zone of *Eriodictyon* furnishes. Figure 8 is the more usual form of bast found in other plants, though occasionally seen in *Eriodictyon*. Figure 7 will give us one of the commonest shapes of bast in *Eriodictyon*; and figure 6 represents a shorter kind often discovered in the bast and also throughout the woody part of the stem. Figure 5 may be called a representative sclerenchymatous cell, though it is found also in the bast zone. Here again we have four forms of cells which represent the transition from bast to sclerenchyma, and all in the same belt of the same plant.

The structure of the leaf of *Eriodictyon glutinosum* is even more suggestive. Figure 11 is a section through such a leaf. The first striking peculiarity is the thickness of the epidermal cells as shown by *a* and by *f*. This is particularly marked in *a*, the upper surface, where not only the thick walls of the cells but the pores in them remind one of figure 3, taken from the outer pith. This as being the more exposed surface would naturally show the denser tissue. The secreting gland, *b*, has no particular import in the present connection. Three rows (ordinarily) of palisade cells come

next underneath the upper epidermis and appear to be special provision against excessive evaporation and are in entire keeping with the thick epidermis. They are thin-walled and contain abundance of chlorophyll, though probably less than the proper parenchymatous cells next below them. These last-named parenchymatous cells are, as might be expected, loose in their aggregation and show numerous open spaces which are in apparent relation to the admission and escape of atmosphere and the contained gases of the plant. The under surface of the leaf is raised into ridges or prominences between which in the cavities so formed the stomata (*h*) are placed under protection of numerous inflected and variously curled hairs (*g*). This mode of placing and protecting the stomata is by no means uncommon, being found also in the *Oleander*, in *Banksia*, and in *Ceanothus prostratus*, to say nothing of many other plants. Sometimes, at least, it is known to be associated with dry habitats; often enough, at least, to suggest the inquiry as to whether it may not be to prevent stomata which occupy such cavities from becoming choked with dust or other foreign bodies. This raises the question as to the meaning, from the standpoint of evolution, of such elevations and depressions on the under surface of the leaf. So far as I am aware they are never seen except in hard-leaved plants, which leaves are also often further protected by a thick coating of hair. Is all this a mere trace remaining of what was once a more common structure, adapted to more variable or more inclement (hot or cold) climate, before the elevations were smoothed away and the hairs were rendered unnecessary by the more genial conditions of present surroundings? This is simple conjecture on my part, but I cannot avoid thinking that it is not far from the truth.—Dr. J. T. Rothrock.

Explanation of Plate II.—*Eriodictyon glutinosum*, Benth.

Figure 1. Typical pith cell X 240, from central part of pith.
Figure 2. Typical pith cell X 240, from outer part of pith.
Figure 3. Less common form of pith cell X 240, from outer part of pith.
Figure 4. Isolated cell X 240, from medullary ray.
Figure 5. Sclerenchym cell X 240, found in the bast zone.
Figure 6. Longer sclerenchym cell X 240, found in bast zone, and also along with woody fibre in interior of stem, where it would be regarded as a thickened form of wood parenchyma.
Figure 7. Typical cell X 240, from bast zone.
Figure 8. More common form of bast cell as found in other plants. *Cinchona flava*, though also occasionally in *Eriodictyon*.
Figure 9. Bast (or sclerenchym?) cell X 120, longitudinal view.
Figure 10. Same X 240, transverse section.

Eriodictyon glutinosum, Benth.

Figure 11. Leaf section; *a*, epidermis of upper surface showing thick walls and pits; *b*, secreting gland backed by striated cuticle; *c*, palisade cells; *d*, parenchym cells; *f*, epidermis of lower surface; *g*, long hairs which guard the stomata (*h*) seated in a cavity on the under surface of the leaf.

Notes on Indiana Plants.

The following additional plants, or localities for plants already recorded for Indiana, may be given, with notes on the more interesting cases.

At Otis, LaPorte, Co., *Geum rivale*, L. and *Viburnum Opulus*, L.

At Pine Station, Lake Co., *Gentiana detonsa*, Fries. Good typical forms, readily distinguished from all ordinary forms of *G. crinita*. From all my experience with the two species growing in this locality, it is hard to tell to which of the two certain individuals that may be found should be assigned. Those at Pine Station are the first that really satisfied me as genuine specimens of the *G. detonsa* of the books, though often finding narrow-leaved plants with petals that could scarcely be called fringed.

At Whiting, Lake Co., *Utricularia resupinata*, Greene. Margins of sandy sloughs, with *Eleocharis dispar*, nobis. The geographical distribution of this plant, as far as I find in published notices, is as follows: Gray's Manual, "Sandy margins of ponds E. Maine to Rhode Island." In *Bulletin of the Torrey Botanical Club*, Suffolk Co., Long Island, Herkimer and Lewis Counties in the northern part of New York, and Erie, Penn. In Wheeler and Smith's Catalogue of Michigan Plants, Woodard Lake, Ionia Co. As it is now found at the southern extremity of Lake Michigan, it is possible that it has gone further westward.

In Cedar Lake, Lake Co., (near Crown Point) *Potamogeton pusillus*, L., and *P. pectinatus*, L. By its margin or in pools or in sluggish streams near by, *P. pauciflorus*, Pursh. Leaves 5-nerved, 3½ inches long; stipules ½ to ¾ inch long. A large form, approaching *P. Niagarensis*, Robbins.

By the shores of Cedar Lake, *Eleocharis palustris*, R. Br., var. *calva*, Gray. Without bristles, but with a prominent pyramidal tubercle, as in the var. *glaucescens*, Gray. The description of the var. *calva* is, "short tubercle;" specimens sent by Rev. Thomas Morong, collected in Vermont, also have the turbercle quite long. In 1881 I gathered plants of this variety along the gravelly banks of St. Mary's River, Sault. Ste. Marie, Ontario, that had the flattened tubercle. In some spikes of the Vermont specimens rudimentary bristles were found. Perhaps the description of the variety should be limited to the absence of bristles.

Polygonum articulatum, L. This grows abundantly in the dry sandy grounds around the head of Lake Michigan, but almost always with the flowers white, or the faintest tinge of "rose." Such had been my experience since first finding it in 1877, until the past season, when plenty of them showed the rose-colored flowers, though the greater part were still the white-flowered kind. I have examined it every year since first seeing it, and must conclude that the white flowers prevail. The variations are not easily explained.

The rose-colored plants almost always grew where they were exposed to the direct rays of the sun, but there were numerous white ones, as on previous years, not in the shade of trees.

Viola lanceolata, L. At Miller's, Lake Co., specimens occur with the serratures of the leaves tipped with reddish glands.

Lechea thymifolia, Michx. (*L. Novæ-Cæsareæ*, C. F. Austin, *fide* W. H. Leggett) This was seen in full bloom Sept. 16, near Tolleston, Ind., the locality where I first found it. It is not easy to find a *Lechea* with the flowers open. The late Mr. Leggett, who is known to have given special attention to them, mentions but one case, that of *L. maritima*, Leggett, (*L. thymifolia*, Gray's Manual) seen in bloom at Cotuit, near Cape Cod (*Torr. Bull.* Oct. 1881). The flowers were abundant on the branches, and made the plants look so different as to be quite pretty objects. The corolla, fully expanded and somewhat wheel-shaped, is about 2 lines in diameter. Petals 3, elliptical, varying from dark red to purple, paler at the base. Stigmas 3, white, plumose. Rafinesque states that the anthesis lasts but a few hours, towards noon. These were found just before midday, and soon closed after placing them in the collecting case.—E. J. HILL, *Englewood, Ill.*

Ballast Plants in Boston and Vicinity.

The preparation of the following list of plants, chiefly ballast species, was suggested to the writer several years ago by the publication of similar lists by others. Some of these may be found in the GAZETTE for November, 1876, August, 1877, May, 1878; the *Torrey Bulletin* for September, 1878, and November, 1879, and the *Proceedings of the Phila. Academy of Sciences* for 1867, 1877 and 1880.

In all of the lists referred to, the general character of the plants is about the same; that is they are for the most part mere weeds (already widely diffused) from the same localities and representing the same natural orders. So that those who find them hereafter may save themselves some trouble by consulting the lists mentioned, before trying to identify the plants.

In the large seaports, where these plants are found, there are generally botanical works in the Public Libraries in which will be found most ballast plants plainly enough described.

They seem to come about equally from the Southern States, S. Europe and Great Britain; with a few from S. America, the Pacific coast, and the West Indies, and an occasional waif from more remote places. So that many may be found in Chapman's Flora, any English handbook, and a German or French Flora.

The following list represents perhaps two-thirds of the species I found between the years 1877 and 1882 (inclusive), and the plants, excepting those marked with an asterisk (which were found *near* Boston), were found within the city limits, on ballast or rubbish

I have seen no record yet of the italicised species having been found in the Northeastern States, though some have probably been found there before.

I am much indebted to Prof. Gray, Prof. Goodale, Prof. Watson, Mr. Isaac C. Martindale, and Mr. F. L. Scribner for determining the species for me. Mr. Scribner identified all or nearly all of the *Gramineæ*.

The affixed letter *e* indicates that the species is established, generally in a small way; *o* means occasionally; *f*, frequently; *s*, found only once.

Ranunculus muricatus, L. s
*Alyssum incanum, L. s
Diplotaxis muralis, DC. e
" tenuifolia, DC. e
Eruca sativa, L. r
Erysimum cheiranthoides, L. o
" repandum, L. s
Rapistrum rugosum, All. s
Senebiera coronopus. DC. o
" didyma, Pers. o
Sisymbrium Sophia, L. s
Thlaspi arvense, L. o
Lychnis Githago, Lam. o
Vaccaria vulgaris, Host. r
Reseda alba, L. s
Malva borealis, Wallm. o
Erodium cicutarium, Sm. f
" moschatum, Sm. o
Geranium dissectum, L. s
Sida carpinifolia, L.,
var. *brevicuspidata*, s
Arachis hypogæa, Willd. o
Coronilla scorpioides, Koch, s
Dalea alopecuroides, Willd. s
Lathyrus aphaca, L. r
Lotus corniculatus, L. e
Medicago denticulata, Willd. f
" *laciniata*, All. s
" *lappacea*, s
" maculata, Sibth. r
" sativa, L. o
Melilotus parviflora, Desf. r
" *sulcata*, Desf. r
Psoralea sp.
Trifolium hybridum, L. e
" resupinatum, L. s
Trigonella corniculata, L. s
" *laciniata*, L. s
Hemizonia pungens, T. & G. s
Hymenatherum tenuilobum DC. s
Hypochæris radicata, L. r
Matricaria inodora, L. e
Pulicaria dysenterica, Cass. r
Senecio viscosus, L. e
Xanthium catharticum, HBK? s
" spinosum, L. o
Campanula Erinus, L. s
Anagallis arvensis, L. r
Linaria cymbalaria, Mill. r
Veronica agrestis, L. r
Verbena bracteosa, Mx. s
" officinalis, L. s
Calamintha Clinopodium, Benth.
Origanum Majorana, L. s
Satureja hortensis, L. o
Thymus Serpyllum, L. r
Asperugo procumbens, L. r
Echinospermum Lappula, Lehm. f
Hyoscyamus niger, L. r
Nicotiana longiflora, Cav. s
Physalis Alkekengi, L. o
" angulata, L. s
" lanceolata, Mx. s
Solanum rostratum, Dunal. r
Atriplex hortensis, L. r
" rosea, L. o
Chenopodium multifidum, L. s
Amarantus paniculatus, Moq. r
" spinosus, L. o
Frœlichia Floridana, Moq. s
Emex spinosa, Campd. s
Polygonum lapathifolium,
var. incanum, f
Croton sp. s
Euphorbia Helioscopia, L. r

Vicia Faba, L. s
" hirsuta, Koch, o
" tetrasperma, Loisel. o
Œnothera sinuata, L. o
Mentzelia sp. s
Coriandrum sativum, L. o
Cuninum cyminum, L. r
Fœniculum vulgare, Gærtn. o
Pimpinella Anisum, L. r
Scandix Pecten, L. r
Galium aparine, L. r
* " Mollugo, L. r
Crupina vulgaris, Pers? r
Scabiosa Columbaria, L. e
Acanthospermum xanthioides, DC. s
Ambrosia trifida, L. r
Anthemis arvensis, L. f
" nobilis, L. o
" tinctoria, L. o
Artemisia annua, L. s
" biennis, Willd. e
Bidens bipinnata, L. o
Carduus acanthoides, L. s
Carthamus tinctorius, L. s
Centaurea Americana, Nutt. s
" calcitrapa, L. r
" cyanus, L. o
**Cotula coronopifolia*, L. e
Eclipta alba, r
Gaillardia sp.
Galinsoga parviflora, e
Helenium tenuifolium, Nutt. s
Mercurialis annua, L. r
Parietaria diffusa, Koch, s
Urtica urens, L. s
Agrostis australis, L. s
" Spica-venti, L. r
Alopecurus agrestis, L. r
Bouteloua Humboldtiana, Griseb. s
Briza maxima, L. s
Bromus brizæformis, s
" *maximus*, Desf, s
" mollis, L. r
" *patulus*, Koch, s
" sterilis, L. s
" tectorum, L. f
Cenchrus tribuloides
Chloris alba, Presl. s
Cynodon Dactylon, Pers. r
Eragrostis poæoides, Beauv., var. megastachya, e
" Purshii, Schrad. e
Festuca Myurus, L. r
" rigida, Kunth, s
Hordeum maritimum, With. s
" murinum, L. r
" pratense, Huds. s
Lappago racemosa, Willd. s
Panicum miliaceum, L. f
Phleum tenue, Schrad. s
Polypogon Monspeliense, Desf. r
Sorghum Halapense, Pers. s
" saccharatum, L. s

—CHAS. E. PERKINS, *Somerville, Mass.*

GENERAL NOTES.

Lindley's Introduction to Botany.—It must have been Lindley's *Introduction to the Natural System of Botany*, which Dr. Torrey admired in 1831. This was issued in England in 1830. Lindley's *Introduction to Botany* was not issued till 1832.—T. M.

Bentham and Hooker's Genera Plantarum.—Part 2 of Vol. III, completing the work, is nearly ready for publication. Those who wish to obtain this part, like the preceding, at trade price, through us, will please to send a notification to that effect to The Curator of the Harvard University Herbarium, Cambridge, Mass., without delay.—A. GRAY.

The trade price in London for the new part is £1.4.0.

Gonolobus Shortii, *G. obliquus*, var. *Shortii*, differs from *G. obliquus* in corolla-lobes more broadly ligulate and obtuse, dark-purple; stamineal crown with about 10-dentate margin, the longer teeth thinnish and narrower, from emarginate to 2-parted, the alternate broader ones thickish and more or less fleshy-appendaged within.—I wish to call attention to this on the part of botanists who may reside in, or may visit the district it inhabits. Dr. Short collected it near Lexington, Kentucky, and noted that the blossoms had the scent of those of *Calycanthus*, as also they have a similar color. The specimen I had to examine was greatly injured; else I might at the first have detected the characters which clearly distinguish it from *G. obliquus*, and associate it rather with *G. Carolinensis*. Dr. Chapman has collected it near Rome, Georgia (where *G. obliquus* also grows), and has furnished good flowering specimens. The fruit is still a desideratum.—A. GRAY.

The Stigma of Catalpa.—At p. 171, this volume, it is noted that at Lansing, Mich., the flattened lobes of the stigma in *Catalpa speciosa* "close in a few seconds after they are touched, close before a bee backs out of the flower." If this observation be correctly made, it will afford another character by which this species may be distinguished from *C. bignonioides*. I have timed this by the watch and never found one to be closed under 45 seconds, and half a dozen bees could enter and depart in that time. Aside from this it will be of great interest if this rapid closing in this plant should be confirmed. There are many species belonging to *Bignoniaceæ* and *Scrophulariaceæ* which have these irritable stigmatic lobes. I have timed many of them. The most rapid in my experience was the common garden *Mimulus*, but this took 15 seconds. A bee is seldom more than from 3 to 5 seconds in any of these flowers. —T. M.

More about Rafinesque.—As an appendix to the interesting sketch of Rafinesque, in the January number of the GAZETTE, the following excerpt from the diary of Audubon, giving an account of a visit from this "odd fish," will be relished by those who have not seen it before. Audubon at the time was living in Kentucky. He says: "I presented my learned guest to my family, and was ordering a servant to go to the boat for my friend's luggage, when he told me he had none but what he had brought on his back. He then loosened the pack of weeds which had first drawn my attention. The naturalist pulled off his shoes, and while engaged in drawing his stockings down to hide the holes in his heels, he explained that his apparel had suffered from his journey. His attire struck me as exceedingly remarkable. A long loose coat of yellow nankeen, much the worse for the many rubs it had got in its time, and stained all over with the juice of plants, hung loosely about him like a sack. A waistcoat of the same with enormous pockets, and buttoned up to the chin, reached below over a pair of tight pantaloons, the lower part of which were buttoned down to the ankles. His beard was as long as I have known my own to be during some of my peregrinations, and his lank black hair hung loosely over his shoulders. His forehead was so broad and prominent that any tyro in phrenology would instantly have

pronounced it the residence of a mind of strong powers. He requested to see my drawings, anxious to see the plants I had introduced besides the birds I had drawn. Finding a strange plant among my drawings he denied its authenticity; but on my assuring him that it grew in the neighborhood, he insisted on going off instanter to see it. When I pointed it out the naturalist lost all command over his feelings and behaved like a maniac in expressing his delight. He plucked the plants one after another, danced, hugged me in his arms, and exultingly told me he had got, not merely a new species, but a new genus. After a day's pursuit of natural history studies, the stranger was accommodated with a bedroom. We had all retired to rest; every person I imagined was in deep slumber save myself, when of a sudden I heard a great uproar in the naturalist's room. I got up and reached the place in a few moments and opened the door; when, to my astonishment, I saw my guest running naked, holding the handle of my favorite violin, the body of which he had battered against the walls in attempting to kill the bats which had entered by the open window, probably attracted by the insects flying around his candle. I stood amazed, but he continued running round and round, until he was fairly exhausted, when he begged me to procure one of the animals for him, as he felt convinced that they belonged to a "new species". Although I was convinced to the contrary, I took up the bow of my demolished Cremona, and administering a smart tap to each of the bats as it came up, soon got specimens enough. The war ended, I again bade him good night, but could not help observing the state of the room. It was strewed with plants, which had been previously arranged with care. He saw my regret for the havoc that had been created, but added that he would soon put his plants to right—after he had secured his new bats."—M. S. B.

EDITORIAL NOTES.

PROF. E. J. HILL, of Englewood, Ill., gave a lecture on the "Means of Plant Dispersion" before the Chicago Microscopical Society at their January meeting.

MR. WILLIAM R. DUDLEY, in the *Torrey Bulletin* for January, describes, with the help of a plate, some interesting cases of adnation occurring between the berries and leaves of *Mitchella repens*.

L. JUST has found that green plants cannot assimilate carbonic oxide but that it does them no harm except when its proportion in the atmosphere exceeds 10 per cent. It then prevents the formation of chlorophyll and hinders assimilation and growth.

DR. MAXWELL T. MASTERS has described in the *Journal of Botany* for February some new *Passifloreæ*, all from South America. A new genus, *Mitostemma*, is represented by two species, one from South Brazil and the other from British Guiana. The genus *Passiflora* receives five new species.

MR. JOSEPH F. JAMES publishes a paper on "Pitcher Plants" in the March *Naturalist*, in which he advances the idea that in *S. purpurea*

the pollen or some secretion of the flower is intoxicating and so the insects drop over the edge of the broad stigma into the open leaf cups below. The theory is supported by analogy and the position of the parts rather than by any direct observation.

M. J. VESQUE has succeeded in devising a method by which the movements of water in plants can be directly observed. In applying this method in testing the theories that are held with regard to the exact route of the ascending water, it appears that the true view is a "golden mean." Under certain conditions the water is transferred by means of the cavities themselves, but they may also serve as reservoirs.

R. ZEILLER has found the stomata on a fossil Cretaceous conifer quite well preserved. Curiously, the cells guarding each stoma are four and occasionally five in number arranged radiately, thus leaving instead of a simple slit a star shaped opening with four or five rays. The stomata are arranged in rows and the orifice is situated at the bottom of a slight depression which is surrounded as in living allies by a slightly projecting edge of cuticle.

MR. FRANCIS WOLLE, of Bethlehem, Penn., in a recent letter, refers to the article in the January number of the *American Naturalist* on the method to be used in interpreting the microscopic portion of the descriptions of Schweinitz, and confirms the conclusions there given. He was in youth acquainted with Schweinitz, and sent him specimens. His microscope was of German make, and in its day was considered a very good one, but would not now be serviceable.

MR. GRANT ALLEN'S theory that petals are transformed stamens rather than leaves, and that hence the earliest and simplest existing petals would be yellow, cannot carry conviction without answering some very serious objections. How the line can be drawn between petals and sepals it is hard to say, and from colored sepals to colored bracts is not a great distance and the relation between leaf and petal seems still a very close one. That yellow is the prevailing color in the *Compositæ* and very common in *Leguminosæ* and *Orchidaceæ*, which are very far from being the "simplest types," is also hard to explain if we accept the statement that the earliest and simplest existing petals would be yellow, and that the colors would change with increased complexity.

DR. J. G. BAKER is publishing in the *Journal of Botany* a Synopsis of the genus *Selaginella*. It seems that, ferns excluded, half the known vascular Cryptogams belong to this genus. Its headquarters are in Tropical America, only two species extending into Europe, and those of the Cape, Temperate Australia, etc., being by no means numerous. The leaf-organs furnish characters for an easy division into four subgenera, depending upon "their arrangement upon either a distichous or multifarious plan and their uniformity in shape and character or dimorphism." The names given to these subgenera are *Selaginella* proper, *Stachygynandrum*, *Homostachys*, and *Heterostachys*, and under them are grouped 312 species.

PROF. J.G. LEMMON claims to have discovered that the potato is indigenous to Arizona. In the Huachuca Mountains last season, in July, he discovered a species of *Solanum* in full bloom, with both the white and

blue flowers. By the 1st of September undoubted potatoes had formed, about an inch and a half long by half as wide and a third as thick. Since then tubers have been found in the same region perfectly white and as large as hen's eggs. If this plant really is the original of all our cultivated varieties much may be hoped from its cultivation, in the way of regenerating the old varieties which have become weak, and we hear that Prof. Meehan predicts great results from this discovery. It is needless to say that Prof. Lemmon found the Colorado beetle quietly munching the leaves of this indigenous potato.

DR. GRAY reviewing in *Science* DeCandolle's work, *Origine des plantes cultivees*, claims that our common bean, *Phaseolus vulgaris*, is a native of America. This is one of the three cultivated plants out of a total of 247, the other two being the rather unimportant species of *Curcubita*, *C. moschata* and *C. ficifolia*, which DeCandolle is unable to trace to its original country. Dr. Gray maintains that it is American, as he has previously done with Indian corn and pumpkins. Fruits and seeds of it were found in the tombs of the ancient Peruvians at Ancon, along with other vegetable products belonging solely to this continent, and with the other two vegetables named, has been cultivated from aboriginal times from Mexico to Canada. It is probable, however, that neither beans nor pumpkins were originally indigenous north of Mexico, or possibly north of the isthmus of Panama.

DR. GRAY, in a private letter, gives us some interesting information concerning Dr. Torrey which so well illustrates his generous disposition that we quote it as follows: "Sir Wm. Hooker confided to Dr. Torrey, at the time when Dr. Torrey visited him at Glasgow, the Carices of those northern collections to be worked up by him. But, while the bundles were still unopened, Dr. Chester Dewey made him a visit at New York. Dr. Dewey was the author of a rival monograph of American Carices, which was published in numerous articles in *Silliman's Journal*, partly contemporaneously with the monograph of Schweinitz and Torrey, and partly later. An inspection of those rich northern collections revived Dr. Dewey's interest in the subject; observing which Dr. Torrey generously offered the collection to his rival for study; and the latter continued his monograph with these materials. Later, when Dr. Torrey had monographed the other N. American *Cyperaceæ*, he appended to it a revised arrangement of *Carex*, and added some new species.

THE FIRST THREE NUMBERS of the new American Journal, *Science* have come to hand. It is a 4to of about 28 pages, and reminds one of the English journal *Nature*, and like that appears weekly. The term "science" has been liberally construed, but in the multiplicity of departments botany receives due attention. The first number devotes five columns to a review by Dr. Gray of DeCandolle's new work on the origin of cultivated plants. In the weekly summary of the progress of science, botany receives two columns in each number. The notes have

so far been prepared by Dr. G. L. Goodale and Mr. Sereno Watson, of Cambridge, Mass., Prof. Wm. Trelease, of Madison, Wis., and Mr. Leo Lesquereux, of Columbus, Ohio. They embrace 32 seperate items gleaned from no less than 18 journals, of which two-thirds are foreign, and cover a wide range of topics. The journal is as invaluable to the botanist as to the worker in any other department of science. It must, however, be regretted that the latest information regarding the minute structure of plants and the vast and interesting field of the lower orders does not receive more attention.

CURRENT LITERATURE.

On the Structures which favor Cross-Fertilization in several Plants (with three plates). By William Trelease. From the Proceedings of the Boston Society of Natural History, Vol. XXI, March 15, 1882. The author of this valuable contribution to the literature of cross-fertilization has long been engaged in a careful investigation of the subject and has repeatedly published valuable results. The present pamphlet is a collection of observations heretofore unpublished, and contains notes upon certain of the *Lemnaceæ*, *Proteaceæ*, *Rutaceæ*, *Ericaceæ*, *Labiatæ* and *Acanthaceæ*, for the most part exotics. *Lemna minor*, however, is a native, and this species, one of the very smallest of phanerogams, seems to be well adapted for crossing though if that is a failure there is a chance for self-fertilization. It is protogynous and the two anthers mature successively some days after the stigma. Cross-fertilization is effected by the aid of currents of water, making it a hydrophilous plant. The *Proteaceæ* are found to be apparently adapted to self-fertilization, but are so formed as to favor crossing, sometimes even to the exclusion of the former, the pollinators including bees, butterflies, and three distinct groups of birds, Kerner's curious conjecture that in *Dryandra* the transfer of the pollen is effected by the Kangaroos being mentioned simply as a curiosity. But our space forbids any fuller mention of the many interesting details to be met upon every page of this pamphlet. Strange as many of the exotic forms are our interest centers about the little *Lemna* whose effort after crossing is a very strong argument in favor of the idea that continued propagation by self-fertilization is not best for a species.

Supplement to Chapman's Botany.—Chapman's Flora of the Southern States has so long been out of print, and discoveries and changes in nomenclature have been so numerous that we had hoped for a revision rather than a reprint with a supplement. It would, however, probably be too much to ask of our oldest American botanist, and we take this supplement as the best substitute, being really a condensed record of discoveries, most of which have already been noted in our various periodicals and published proceedings of our learned societies. Most of the additions come from Florida, whose flora, so deeply tinged with West Indian forms, has been most zealously examined for the past few years, and the names of Curtiss, Garber, Miss Reynolds, and others, are closely associated with that of Dr. Chapman himself. No fewer than 200 species from Florida have thus been added to our catalogue of the Southern Flora, and this means only species which have not yet been found to extend beyond the limits of the State. The region most favored in new forms, after Florida, is that nest of mountains which is found

where Tennessee, North Carolina, and Georgia interlock and runs northward through Eastern Tennessee and Western N. Carolina. Here are discovered many forms from the north, having found in the elevations of the mountains compensation for a more southern latitude, no fewer than 65 such species being noted in this supplement. Speaking of the northerners we remark the occurrence of *Sedum Rhodiola* in the Mts. of N. C., which was found years ago clinging to a cool cliff near Easton, Penn., and taken as an example of a stranded glacial visitor. *Asplenium ebenoides*, too, has been found in shady ravines in central Alabama, and *Erythronium albidum* upon the very summit of Roan Mountain. The Mississippi river has also kept up a movement of species southward and its influence is very noticeable in glancing over this supplement. Naturally the West has not contributed so many forms as either the South or North, for the barriers in that direction are greater. We note, however, about 25 species which may be considered to have come from the West. These figures of course only apply to the supplement, and in a study of the original Manual it will be seen that this composite flora is tinged more from the north than from the south on account of the greater ease of communication in that direction; while the western forms still remain in the background. Some 15 species are published here for the first time, 10 of them bearing Dr. Chapman's name as author, and 12 of them from Florida. They are an *Alsine*, *Polygala*, *Petalostemon*, *Ludwigia*, *Pinguicula*, two *Euphorbias*, *Croton*, *Tillandsia*, *Xyris*, *Cyperus*, *Rhynchospora*, two *Paspalums*, and an *Andropogon*. Two orders for the first time find place in our Flora, namely, *Casuarineæ* and *Piperaceæ*, containing together 3 species, all from Florida.

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DUDLEY, WILLIAM R.—Leafy Berries in Mitchella repens (with plate), *Torr. Bull*, X, p. 1.

ELLIS, J. B.—New Species (35) of N. Am. Fungi, *Am. Nat.* XVII, pp. 192, 316.

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HITCHCOCK, ROMYN.—Unicellular Algæ, *Am. Mo. Mic. Jour.* IV, p. 21.

JAMES, JOSEPH F.—Pitcher Plants, *Am. Nat.* XVII, p. 283.

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WAGER, JOHN.—The Danish Forest, II, *Sci. Gossip*, No. 218, p. 29.

WIESNER, J.—Notice of the Memoir of Dr. Julius Wortman upon Nutation, *Bot. Zeit.* Feb. 2.

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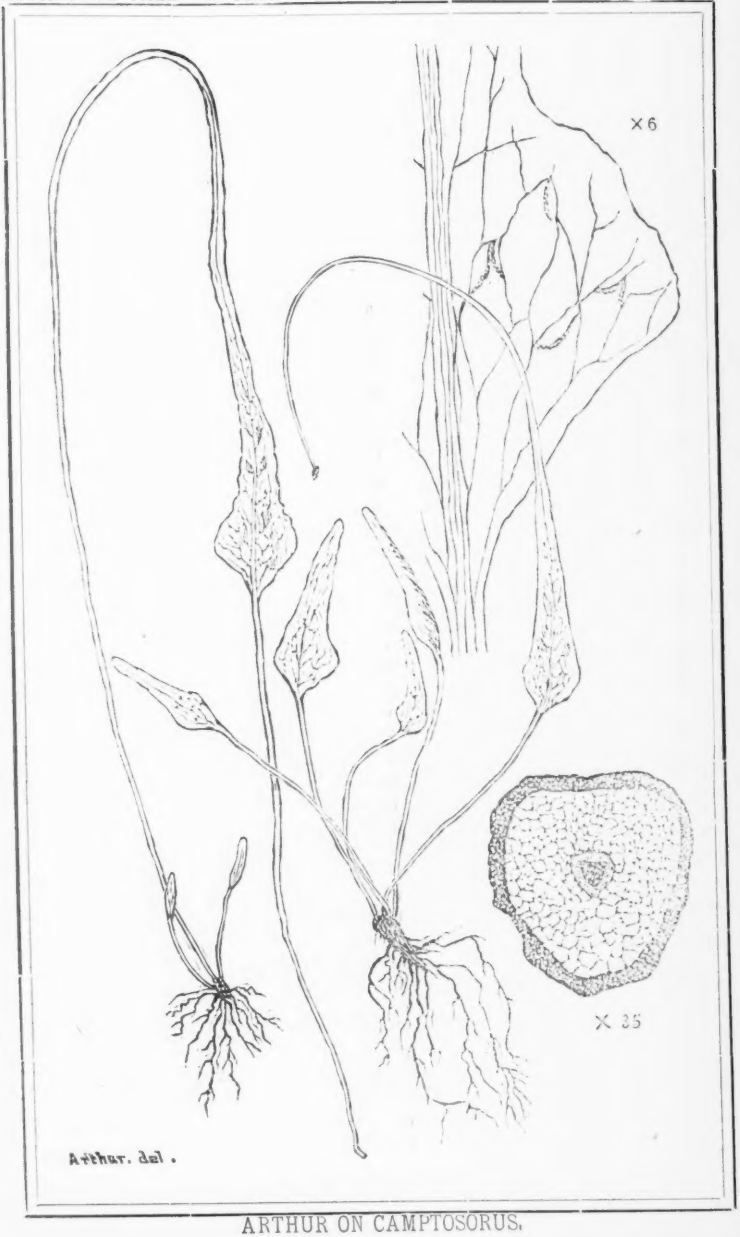

ARTHUR ON CAMPTOSORUS.